

## RESEALABLE NURSER LINER

## BACKGROUND OF THE INVENTION

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## 1. Field of the Invention

The present invention relates generally to liners for  
10 nurser bottles. More particularly, the present invention  
relates to liners that are resealable.

## 2. Description of the Prior Art

15 Disposable liners for containing liquids are used  
with rigid holders to provide a clean, sanitary container  
for each use, instead of reusable bottles which require  
regular washing and sometimes give questionable results  
regarding cleanliness. Typically, a liner is mounted onto a  
20 holder by gripping the upper edge of the liner, drawing the  
edge over an open rim of the holder, and folding the edge  
downward over the outer surface of the holder. The liner is  
then filled with a desired liquid, and a cover, such as a  
nursing nipple, may be attached to the holder to close the  
25 mouth of the liner.

To further increase the hygiene associated with the  
liners, resealable closure members have been incorporated  
laterally or horizontally across the liners. In U.S. Patent  
30 No. 6,576,278 to Sprehe, a nurser liner is shown having a  
continuous, elongated, profiled reclosable fastener disposed  
laterally across the periphery of the top portion of the

enclosure area. The width of the Sprehe liner, and hence the length of the closure member, is in proximity to the diameter of the holder. In U.S. Patent No. 5,385,251 to Dunn, a nurser liner is shown having a sealing member made up of cooperating projection members that are disposed laterally across the periphery of the top portion of the enclosure area. Similar to the Sprehe liner, the Dunn liner has a width, and hence a sealing member length, that is in proximity to the diameter of the holder. The Sprehe patent asserts that the sealing member can be used to assist in retaining the liner on the holder when the open end of the liner is folded back over the open end of the holder.

Such liners suffer from the drawback of being difficult to assemble with the holder. The lack of flexibility across the closure member or fastener, which needs to be pulled over the neck of the holder and the holder threads, and the close proximity of the length of the closure member or fastener compared to the diameter of the holder, make the assembly difficult. Often, the fastener needs to be stretched before it will be folded over the rim. This provides the risk of tearing, as well as requiring more handling of the bag and the added risk of contaminating the bag. Precious breast milk may spill and/or the bag may break from pulling it over the holder neck and threads.

#### SUMMARY OF THE INVENTION

Against the foregoing background, it is a primary object of the present invention to provide a liner having a

closure member that facilitates assembly of the liner with the holder.

It is another object of the present invention to  
5 provide such a liner that is easily manipulated.

It is yet another object of the present invention to provide such a liner with a resealable member that is easily manipulated.

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It is still another object of the present invention to provide such a liner with tabs that improve gripping during opening and mounting of the liner.

15 These and other objects and advantages of the present invention are provided by a flexible liner for storage of liquid for feeding of an infant. The liner has an enclosure and a closure member. The enclosure has a sealed periphery except for an opening. The enclosure defines an inner  
20 volume for storage of the liquid. The closure member is resealable and traverses the opening for providing selective access to the inner volume. The closure member has a non-linear shape.

25 The present invention is also provided by an infant feeding assembly that has a flexible liner and a holder. The liner has an enclosure and a closure member. The enclosure has an opening and defines a first volume. The closure member is resealable and traverses the opening for  
30 providing selective access to the first volume. The holder has an open end and defines a second volume. The liner is

disposed in the second volume. The closure member has a non-linear shape.

5 The present invention is also provided by an infant feeding assembly that has a flexible liner and a holder. The liner has an enclosure and defines a first volume. The enclosure has an opening and traverses the opening. The closure member is resealable and defines a first volume. The closure member is movable between first and second positions. The first position seals the opening. The opening. The second position allows access through the closure member has an inner cross-sectional area when in the first position. The holder has an open end with an outer cross-sectional area. The holder defines a second volume. The flexible liner is disposed in the second volume. The inner cross-sectional area is greater than the outer cross-sectional area so that the closure member can slide past the open end.

20 The present invention is also provided by a nurser liner for use with a holder having an opening. The liner has a liner body, a rim and a closure member. The liner body has an upper volume. The liner body defines an inner volume. The rim is disposed on the upper portion and extends outwardly from the liner body. The rim is selectively engageable with the holder opening. The closure member is selectively resealable and traverses the open end of the liner body for providing selective access to the inner volume.

25 The present invention is also provided by an infant feeding assembly that has a nurser liner and a holder. The

nurser liner has a liner body, a rim and a closure member. The liner body has an upper portion with an open end. The liner body defines a first volume. The rim is disposed on the upper portion and extends outwardly from the liner body.

5 The holder has an opening and defines a second volume. The closure member is selectively resealable and traverses the open end of the liner body for providing selective access to the first volume. The rim selectively engages with the holder opening for disposing the nurser liner in the second  
10 volume.

The closure member can have a semi-circular shape. The semi-circular shape can be upwardly convex. The closure member can also have a V-like shape. The V-like shape can  
15 be inverted. In either embodiment, the enclosure can have first and second panels with the same size and shape. The first and second panels can be heat-sealed along the sealed periphery. The flexible liner can have an identification area for identifying the liquid. The closure member can  
20 partially define the identification area.

The first and second panels can have a substantially rectangular shape. The first panel can have a first tab. The second panel can have a second tab. The first and  
25 second tabs can be perforated for removal. Each of the first and second tabs can have a textured surface and a non-textured surface. The flexible liner can have a gusset. The closure member can have a plurality of projection members.

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The liner rim has an upper surface and the closure member can be disposed along that upper surface. The

closure member can be disposed along an inner portion of the upper surface of the liner rim. The nurser liner and/or the liner body can be elongated and can also have a substantially cylindrical shape.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing, and still further objects and advantages  
10 of the present invention, will be more apparent from the following detailed explanation of the preferred embodiments of the invention in connection with the accompanying drawings:

15 FIG. 1 is a plan view of a flexible liner of the present invention;

FIG. 2 is a perspective view of the liner of FIG. 1 in an open position and assembled with a holder;

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FIG. 3 is a side cross-sectional view of the liner of FIG.1 taken along line 3-3 of FIG. 1;

FIG. 4 is a side cross-sectional view of the liner of  
25 FIG.1 taken along line 3-3 of FIG. 1, with an alternative embodiment of the tabs of the present invention;

FIG. 5 is a plan view of an alternative embodiment of the liner of the present invention;

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FIG. 6 is a perspective view of the liner of FIG. 5 in an open position and assembled with the holder;

FIG. 7 is a perspective view of another alternative embodiment of a resealable liner of the present invention with the closure member of FIG.1 in an open position;

FIG. 8 is a perspective view of another alternative embodiment of a resealable liner of the present invention with the closure member of FIG.1 in an open position; and

FIG. 9 is an exploded front view of the liner of FIG. 8 partially assembled with a holder.

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#### DESCRIPTION OF THE INVENTION

Referring to the drawings and, in particular, to FIG. 1, there is provided a liner of the preferred embodiment, which is generally represented by reference numeral 10. The liner 10, preferably, has a collapsed or flattened rectangular shape and can be manipulated into a tubular or cylindrical shape by expanding the inner volume of the liner.

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The liner 10 has upper and lower ends 20, 25. The liner 10 is preferably formed by a first panel 50 and a second panel 100. First and second panels 50, 100 are connected along a periphery 30 of the liner 10, except at upper end 20, to form a sealable enclosure 40. However, enclosure 40 can be alternatively formed, such as, for example, a tubular sidewall. Preferably, first and second

panels 50, 100 are heat-sealed together along the periphery 30 of the panels. However, alternative securing methods can also be used to form enclosure 40, such as, for example, adhesive. Lower end 25 of the liner 10 preferably has a  
5 gusset 27 or other type of fold, which provides added strength and facilitates opening of the liner from its collapsed state. Additionally, gusset 27 allows the bag to stand on its own when in an opened state for convenience to the user.

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Preferably, first and second panels 50, 100 along upper end 20 have first and second tabs 60, 110, respectively.

First and second tabs 60, 110 preferably have a trapezoidal shape such that the left side of the tab is substantially  
15 symmetrical to the right side of the tab. First and second tabs 60, 110 preferably each have first, textured surfaces 65, 115 and second, non-textured surfaces 70, 120, which are opposite the first surfaces. In the preferred embodiment, a tab perforation 45 is provided at the base of each tab 60,  
20 110 to facilitate removal of the tabs after the liner 10 has been assembled in a rigid holder 300. The holder 300 has a rim 325 with threads 350 disposed thereon as shown in FIG.

2. An example of a holder usable with liner 10 is disclosed in U.S. Application Serial No. 10/426,902, filed April 30,  
25 2003, which is commonly owned with this pending application. Applicants hereby incorporate by reference the disclosure of that application in its entirety. However, the present invention is usable with other types of holders of varying sizes, shapes and securing structures.

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In a preferred embodiment, the first surfaces 65, 115 of tabs 60, 110 are preferably at least partially textured



and have a tactile feel, whereas the second surfaces 70, 120 have a non-tactile feel. The textured surface 115 is positioned adjacent a non-textured surface 70 when the liner 10 is in its collapsed or flattened form.

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First and second tabs 60, 110 have a plurality of protuberances 75, 125 on their first, textured surfaces 65, 115 and a plurality of penetrated depressions 80, 130 on their second, non-textured surfaces 70, 120. Preferably, the protuberances 125 of second tab 110 correspondingly mate with the depressions 80 on the first tab 60 when the liner 10 is in its collapsed or flattened form. The texture of the first surfaces 65, 115 remains, even when the first and second tabs 60, 110 are separated from each other.

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Referring to FIGS. 1 through 3, liner 10 has a resealable, closure member 200. Closure member 200 allows selective access to the interior volume of enclosure 40 and provides a substantially air-tight seal for the enclosure for the storage of liquids, such as, breast milk. In this embodiment, closure member 200 is a plurality or series of corresponding projection members 210 disposed adjacent to each other, which engage with each other when pressed together. The projection members 210 can have shapes that facilitate the engagement and disengagement of the closure member 200. While the preferred embodiment uses sealing projection members 210, the present invention contemplates the use of alternative resealable closure structures and/or methods, such as, for example, a zipper-type closure. Also, closure member 200 can be heat-sealed into position along first and second panels 50, 100. This heat-sealing can be

done at the same time that the first and second panels 50, 100 are heat-sealed along periphery 30.

Closure member 200 has a non-linear shape and traverses  
5 upper portion 20 of liner 10. In this embodiment, closure member 200 has an upwardly convex shape that is substantially semi-circular. However, alternative non-linear shapes for closure member 200 can also be used, such as, for example, an elliptical shape or a downwardly concave  
10 shape that is substantially semi-circular.

The non-linear shape of closure member 200 provides for a total length of the closure member when in an opened position, which is greater than the total length of the rim  
15 325 (or threads 350 thereon) of the holder 300. As shown in Fig. 2, closure member 200, which has a substantially semi-circular shape when liner 10 is in a collapsed position, has a substantially circular shape when liner 10 is in an open position. Closure member 200 in an open position has a  
20 circumference  $c_1$  and an inner diameter  $d_1$ , which is greater than a circumference  $c_2$  and an outer diameter  $d_2$  of rim 325 (or threads 350) of the holder 300. This facilitates assembly of liner 10 with holder 300 by allowing the closure member 200 to easily pass over the outside of the rim 325  
25 and/or threads 350 of the holder. Preferably, the clearance between the inner portion of closure member 200 and the outer portion of rim 325 or threads 350 is substantial enough so that the user can easily pass the sealing projection 210 over the rim and threads, and so that the  
30 closure member does not need to make any contact with the rim or threads. Thus, the closure member 200 does not assist in retaining the liner 10 on the holder 300. Liner

10 can have an inner volume that is substantially equal to the inner volume of holder 300 but without the difficulty of assembling the liner with the holder. The non-linear shape of closure member 200 allows liner 10 to be used with  
5 holders 300 having differently-sized open ends, while still maximizing the inner volume of enclosure 40.

The arcuate shape of closure member 200 partially defines an identification area 220 shown in FIG. 1.  
10 Identification area 220 allows a user to label the contents of liner 10. Identification area 220 is disposed along liner 10 in a position that is along the enclosure 40 and, in this embodiment, due to the arcuate shape of closure member 200, the area will not be in proximity to the liquid  
15 contents of the liner. The positioning of identification area 220 reduces the risk of puncturing the liner 10 and/or contaminating the liquid contents when the user labels the liner.

20 Closure member 200 has an apex 230. Apex 230 can facilitate handling and manipulation of liner 10 by providing a place for a user to grasp the liner. The arcuate shape of apex 230 facilitates engagement of a user with his or her fingers.

25 The operation of mounting the liner 10 of the preferred embodiment to rim 325 of rigid holder 300 is shown in FIG. 2. First, the liner 10 is inserted down into the interior of the holder 300 through the rim 325. First tab 60 of the  
30 liner 10 is grasped by a thumb and finger of one hand while second tab 110 is, likewise, grasped by the other hand. Next, the first and second tabs 60, 110 are drawn apart to

fully open closure member 200. The open upper end 20 of liner 10 is then pulled down over the rim 325 of the holder 300. The liner 10 is drawn downward over the outer periphery of the rim 325 until the closure member 200 passes the threads 350. In the preferred embodiment, the tabs 60, 110 are then pulled and, thus, removed from the liner 10. The liner 10 can then be secured in place by screwing a nipple ring (not shown) to threads 350.

The material for the liner 10 may be any type of thin sheet or film of elastomeric material, such as polyolefin resins and blends, suitable for the features described herein and may be pierced by a cutting tool. The group of polyolefin resins and blends includes low density polyethylene (LDPE), linear low density polyethylene (LLDPE), medium density polyethylene (MDPE), high density polyethylene (HDPE), polypropylene (PP) and ethylene-vinyl acetate (EVA) or other rubber or plastic materials that provide suitable strength in thin walled liner form. The preferred material is a polyethylene resin, and more preferably low density polyethylene. Additionally, a multi-layer material can be used to provide for improved barrier protection for the enclosure 40, such as, for example, to limit the transmission of oxygen through the liner 10 and to absorb UV rays or impede them from transmitting through the liner to the breast milk stored in enclosure 40.

Referring to FIG. 4, liner 10 is shown with an alternative design for first and second tabs 60, 110. First and second tabs 60, 110 have textured surfaces 65, 115 on opposing sides of each of the tabs. Preferably, textured surfaces 65, 115 are formed by a plurality of protuberances 75,

125, respectively. More preferably, first and second tabs have a plurality of penetrated depressions 80, 130 formed on each side of the tabs, respectively.

5 Referring to FIGS. 5 and 6, an alternative embodiment of the liner of the present invention is shown and generally represent by reference numeral 11. Liner 11 has similar features to liner 10, which are represented by the same reference numerals, but liner 11 has an alternative closure  
10 member 400.

Closure member 400 has a non-linear shape that traverses upper end 20 of liner 11 to allow for selective sealing of enclosure 40 through use of a series of sealing  
15 projection members 410. Closure member 400 has an inverted V-like shape. The inverted V-like shape of closure member 400 provides for an inner cross-sectional area  $A_1$  that is greater than the outer cross-sectional area  $A_2$  of rim 325 of holder 300 as shown in FIG. 6. Thus, closure member 400 can  
20 be easily folded over the rim 325 and assembled with the holder 300.

While the preferred embodiment and the alternative embodiment have non-linear closure members 200, 400 that are  
25 semi-circular and V-like in shape, respectively, the present invention contemplates the use of closure members that when in a fully opened position provide a greater cross-sectional area than does a closure member that is horizontally or laterally disposed across the liner.

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Referring to FIG. 7, there is shown another alternative embodiment of a resealable nurser liner generally

represented by reference numeral 700. The nurser liner 700 comprises a generally cylindrical enclosure or sack having an open end 712 and a liner body 714. Preferably, liner 700 has a slight downward taper away from open end 712.

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Liner 700 has the non-linear closure member 200, as described above with respect to FIGS. 1 through 3, to selectively close the open end 712 and seal the liner. However, the present invention contemplates the use of other selectively sealable members, including linear and non-linear sealing members, for the sealing of liner 700.

Closure member 200 is secured to liner body 714 about the entire circumference of open end 712. Closure member 200 is preferably harder and more resilient than the liner body 714. This facilitates use of the liner 700, including maintaining the liner in an opened position when desired.

Closure member 200 bends along creases 720, 721 to selectively seal the liner 700. Liner body 714 can have an inner diameter  $d_3$  greater than the outer diameter  $d_2$  of the rim 325 of the holder 300 shown in FIG. 2. This facilitates assembly of closure member 200 over rim 325 when the liner body 714 is disposed in the holder 300 by allowing the closure member to easily pass over the holder rim 325. Liner body 714 can also have a larger downward taper so that inner diameter  $d_3$  of closure member 200 is greater than the outer diameter  $d_2$  of the rim 325 while most of liner body 714 has a diameter that is approximately equal to the inner diameter of the holder 300 (not shown).

Liner body 714 preferably has a substantially smooth surface, and more preferably does not have heat-sealing longitudinally along its cylindrical sidewall. If a tubular sleeve is used for a portion of liner body 714, then a  
5 bottom wall (not shown) can be heat-sealed (or other securing method utilized) to enclose the bottom end of the liner body while closure member 200 is heat-sealed (or other securing method utilized) about liner open end 712. Liner 700 can also incorporate the features described above with  
10 respect to liners 10, 11 of FIGS. 1 through 6, such as, for example, first and second tabs 60, 110.

Referring to FIGS. 8 and 9, there is shown another alternative embodiment of a resealable nurser liner  
15 generally represented by reference numeral 800. The nurser liner 800 comprises a generally cylindrical enclosure or sack having an open end 812 and a liner body 814. Preferably, liner 800 has a slight downward taper away from open end 812.

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The open end 812 of liner 800 has a resilient flange or rim 830 extending outwardly along its entire circumference. The liner rim 830 is preferably rigid enough to support the weight of fluid contained in liner 800 when mounted in a  
25 liner holder 900, as shown in FIG. 9, and held in place by a nipple ring or other securing structure (not shown) against the upper surface of holder rim 925 of the holder. This can be achieved by a combination of proper liner rim thickness and material selection. The liner rim 830 can preferably  
30 bend along creases 820, 821 to selectively seal the liner 800, as will be described later.

Liner 800 has the non-linear closure member 200, as described above with respect to FIGS. 1 through 3, to selectively close the open end 812 and seal the liner. However, the present invention contemplates the use of other  
5 selectively sealable members, including linear and non-linear sealing members, for the sealing of liner 800.

Closure member 200 can be secured to liner rim 830. Closure member 200 can be heat sealed along the upper  
10 surface of the liner rim 830 or other securing methods can be utilized. Closure member 200 can also be secured along the inner periphery or portion of the upper surface of liner rim 830 to leave a flat engagement surface 835 exposed for abutment with the nipple ring or other securing structure  
15 (not shown). Closure member 200 bends along creases 720, 721 while liner rim 830 bends along creases 820, 821 to selectively seal the liner 800. Liner rim 830 has an outer diameter  $d_4$  that is greater than the inner diameter  $d_5$  of the holder rim 925 so that the liner rim can be seated upon  
20 the holder rim to hold the liner 800 in place.

Alternatively, liner rim 830 can be separately disposed from closure member 200, such as, for example, above the liner rim and secured to a portion of the liner body 814  
25 that extends above the liner rim (not shown). The liner rim 830 would allow for seating the liner 800 in the holder 900 while the closure member would selectively seal the liner 800 when desired.

30 The invention having been thus described with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications may be



made therein without departing from the spirit and scope of  
the invention as defined in the appended claims.

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